DM5810/DM6810 Driver for Linux

Driver Version 2.0.x User's Manual

RTD Embedded Technologies, Inc.

(Real Time Devices)

"Accessing the Analog World"®

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rev A

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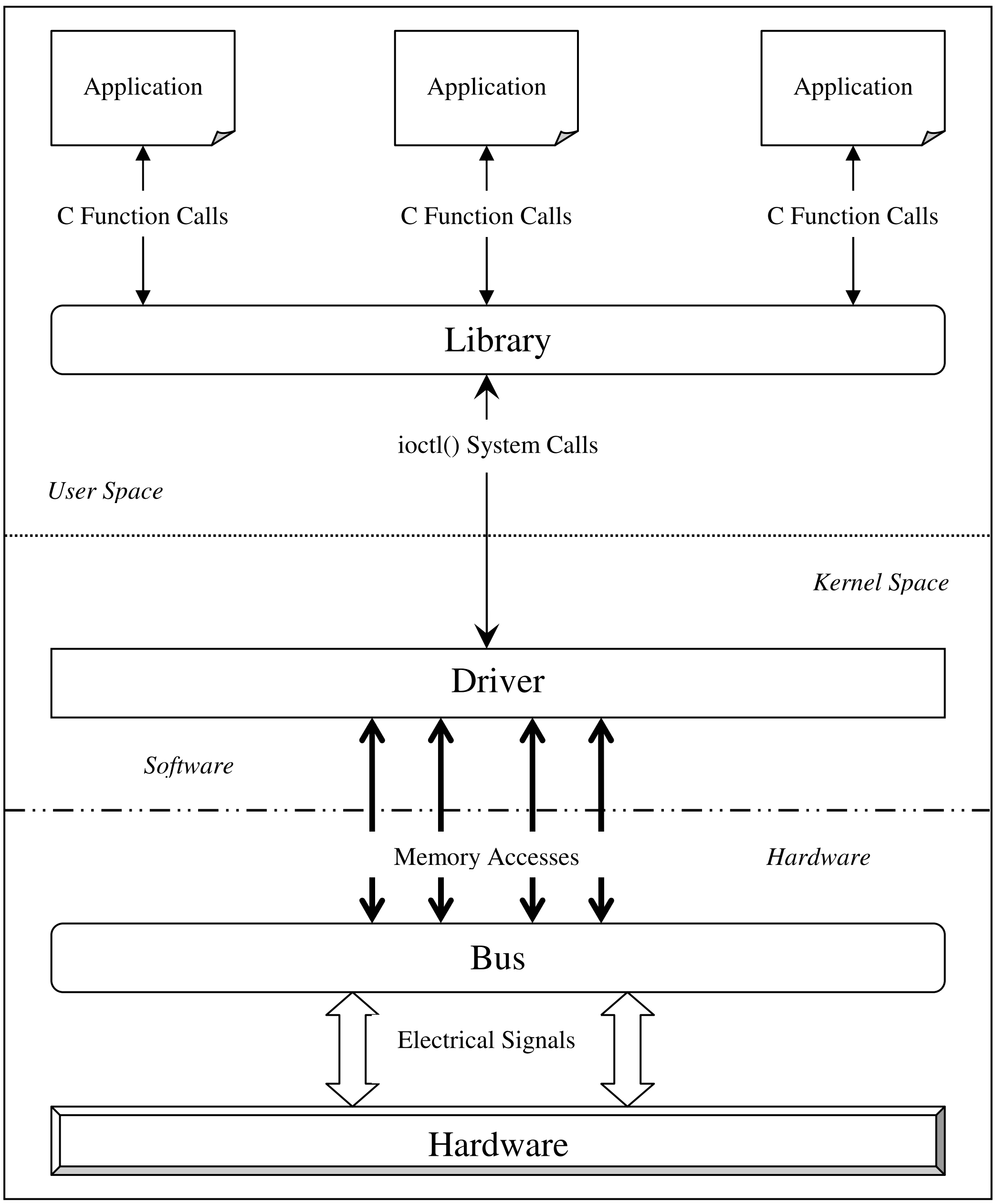
Introduction

This document targets anyone wishing to write Linux applications for an RTD DM5810 or DM6810 dataModule. It provides information on building the software and about the Application Programming Interface used to communicate with the hardware and driver. Each high-level library function is described as well as any low-level ioctl() system call interface it may make use of.

The diagram below 1) provides a general overview of what hardware and software entities are involved in device access, 2) shows which units communicate with each other, and 3) illustrates the methods used to transfer data and control information.



Notational Conventions

RTD Linux drivers are assigned version numbers. These version numbers take the form "**A**.**B**.**C**" where:

* **A** is the major release number. This will be incremented whenever major changes are made to the software. Changing the major release number requires updating the software manual.
* **B** is the minor release number. This will be incremented whenever minor, yet significant, changes are made to the software. Changing the minor release number requires updating the software manual.
* **C** is the patch level number. This will be incremented whenever very minor changes are made to the software. Changing the patch level number does not require updating the software manual.

In this document, you will see driver version numbers with a letter in them. For example, 2.0.x indicates that the topic being discussed is applicable to driver versions with a major release number of 2, a minor release number of 0, and any patch level number.

Occasionally you will notice text placed within the < and > characters, for example <installation path>. This indicates that the text represents something which depends upon choices you have made or upon your specific system configuration.

Installation Instructions

Extracting the Software

All software comes packaged in a gzip'd tar file named dm6810_Linux_v2.0.x.tar.gz. First, decide where you would like to place the software. Next, change your current directory to the directory in which you have chosen to install the software by issuing the command "cd <installation path>". Then, extract the software by issuing the "tar -xvzf <path to tar file>/dm6810_Linux_v2.0.x.tar.gz" command; this will create a directory dm6810_Linux_v2.0.x/ that contains all files comprising the software package.

Contents of Installation Directory

Once the tar file is extracted, you should see the following files and directories within dm6810_Linux_v2.0.x/:

driver/
examples/
include/
lib/
CHANGES.TXT
LICENSE.TXT
README.TXT

The file CHANGES.TXT describes the changes made to the software for this release, as well as for previous releases. The file LICENSE.TXT provides details about the RTD end user license agreement which must be agreed to and accepted before using this software. The file README.TXT contains a general overview of the software and contact information should you experience problems, have questions, or need information. The directory driver/ contains the source code and Makefile for the drivers. The directory examples/ holds the source code and Makefile for the example programs. The directory include/ contains all header files used by the driver, example programs, library, and your application programs. Library source code and Makefile reside in the directory lib/.

Building the Driver

Driver source code uses files located in the kernel source tree. Therefore, you must have the full kernel source tree available in order to build the driver. The kernel source tree consumes a lot of disk space, on the order of 100 to 200 megabytes. Because production systems rarely contain this much disk space, you will probably use a development machine to compile the driver source code. The development system, which provides a full compilation environment, must be running the exact same version of the kernel as your production machine(s); otherwise the kernel module may not load or may load improperly. After the code is built, you can then move the resulting object files, libraries, and executables to the production system(s).

Building the driver consists of several steps: 1) compiling the source code, 2) loading the resulting kernel module into the kernel, and 3) creating hardware device files in the /dev directory. To perform any of the above steps, you must change your current directory to driver/. The file Makefile contains rules to assist you.

To compile the source code, issue the command “make”. The GNU C compiler gcc is used to build the driver code. This will create the driver object file, which is named rtd-dm6810.o on 2.4 kernels and rtd-dm6810.ko on 2.6 kernels.

Before the driver can be used, it must be loaded into the currently running kernel. Using the command “make insmod” will load the DM6810 driver into the kernel. This target assumes that:

* A single DM6810 is installed.
* The board's base I/O address is set to the factory default of 0x300.
* The DM6810 is jumpered to use IRQ 5.

If the previous assumptions do not match your hardware setup, you will need to edit the Makefile and change this rule to reflect your board configuration or manually issue an appropriate insmod command.

For the 2.4 kernel, when you load the kernel driver the message

"Warning: loading rtd-dm6810.o will taint the kernel: non-GPL license - Proprietary"

will be printed on your screen. You can safely ignore this message since it pertains to GNU General Public License (GPL) licensing issues rather than to driver operation.

For the 2.6 kernel, when you load the kernel driver, no warnings will appear on your screen. However, the warning

"module license 'Proprietary' taints kernel."

will be written to the system log when the module is loaded. You can safely ignore this message since it pertains to GNU General Public License (GPL) licensing issues rather than to driver operation.

The final step is to create /dev entries for the hardware. Versions of the driver prior to 2.0.0 always assumed a character device major number of 252 when registering the boards and creating the /dev entries. Instead, the driver now asks the kernel to dynamically assign a major number. Since this major number may change each time you load the driver, the best way to create the device files is to use the command "make devices"; this generates four files in /dev named rtd-dm6810-0 through rtd-dm6810-3.

Be aware that driver/Makefile uses the "uname -r" command to determine which kernel version it is running on. It does this to set up separate make rules and variables for the 2.4 and 2.6 kernels, which allows one set of targets to work on both kernels. Compiling the driver on a development machine which does not run the same kernel version as the production machine that will host your application almost certainly invites trouble.

If you ever need to unload the driver from the kernel, you can use the command "make rmmod".

Building the Library

The example programs and your application use the DM6810 library, so it must be built before any of these can be compiled. To build the library, change your current directory to lib/ and issue the command “make”. The GNU C++ compiler g++ is used to compile the library source code. To prevent compatibility problems, any source code which makes use of library functions should also be built with g++.

The DM6810 library is statically linked and is created in the file librtd-dm6810.a.

Building the Example Programs

The example programs may be compiled by changing your current directory to examples/ and issuing the command “make”, which builds all the example programs. If you wish to compile a subset of example programs, there are targets in Makefile to do so. For example, the command “make digital-interrupts digital-io interrupt-wait” will compile and link the source files digital-interrupts.cpp, digital-io.cpp, and interrupt-wait.cpp. The GNU C++ compiler g++ is used to compile the example program code.

Interrupt Performance

Conditions Affecting Performance

The driver provides an interrupt notification feature which applications can use to wait for an interrupt to occur. Once this interrupt happens, an application usually performs some sequence of actions and then waits for another interrupt. This paradigm by its nature involves both kernel and user level; the driver resides in kernel space and your application resides in user space. This model provides flexibility and reduces complexity but has limitations like all software. There are many things which can affect performance when the user application waits for an interrupt and then is notified of its occurrence by the driver.

Putting a user process to sleep in the kernel to wait for the interrupt and then waking it up is expensive in terms of time needed. This delay interferes with the usable work a process can do and how fast it can do it. Additionally, when a process exits the kernel there may be other work for it to do (for example checking for and handling signals) before it resumes what it was doing in user space.

Dependent upon the other processes runnable on a system, your application may not be selected to run on the CPU for some time after it is woken up by an interrupt. Ignoring other factors for the moment, the higher the number of runnable processes the more likely it is that your application will not be selected to run right away.

If the user application incurs a page fault, that is accesses an address which is valid but not currently loaded into main memory, the process must be put to sleep until the kernel brings that memory page into main memory from some device much slower than memory. Your application can perform no useful work while it slumbers.

Process scheduling priority affects which process gets chosen to run on the CPU. If your application has a scheduling priority lower than most other processes, it will not be selected to run if at least one of the higher priority processes is ready to run. Furthermore, a runnable process with a scheduling priority lower than that of a running process cannot preempt that process and begin running on the CPU.

Other interrupts may affect an application. A system's interrupt controller usually assigns a priority to each interrupt. Thus, a higher priority interrupt can interfere with the interrupt your application is interested in by keeping it pending until the higher priority interrupt is serviced. Worse, if several interrupts occur while one is being processed some of them may be lost.

The delays inherent in any of the above situations affect how quickly an application can respond to an interrupt and how many interrupts can be processed in a given period of time. The application may miss or lose interrupts, especially if interrupts occur quickly enough. A board may enter an inconsistent state if interrupts are not acknowledged reasonably.

Improving Performance

To address the number of runnable processes issue, conduct an audit of the system and determine which processes you do not need. For each such process, some of the changes you can make are to modify the system configuration such that the process is not started at boot, ensure that the capability's kernel module is not loaded, or disable the functionality at the hardware level. The smaller the number of processes the more likely it is that your application will be granted the CPU when it needs it.

A process can lock its memory pages into main memory to prevent page faults. Not having to wait for a page fault to be serviced means that a process has more time available for useful work. Locking pages into memory during program initialization ensures that all pages are resident in memory, thus any access to them will not fault. There are some situations in which page faults can still occur but locking pages into memory greatly reduces the likelihood of them occurring. Please see the mlockall(2) man page for more information.

You can change a process' scheduling priority and class under Linux. A process' scheduling priority can be increased so that it will be chosen to run before other processes with lower priority. Changing a process' scheduling class can disable scheduling time quantums for it, which means that the process will not be rescheduled just because its CPU time slice has expired. You must exercise extreme caution when modifying scheduling parameters because a process can enter a state where it will be given preference over all other processes, thus deferring certain system activity. The system may even become unresponsive in some ways. Please see the sched_setscheduler(2) man page for more information.

If it's possible to assign a specific interrupt, pick one that has a higher priority than other interrupts. This will allow your device's interrupt to take precedence over other lower priority interrupts that you may not be as interested in. Again, extreme caution must be used because deferring certain interrupts may affect system activity.

As a last resort, you can rewrite the driver's interrupt handler to implement whatever functionality you require. The upside is that doing so offers the most control over interrupt response. The downside is that this approach requires kernel programming knowledge.

Rewriting the Interrupt Handler

Suppose that you have the following requirements: 1) the only interrupt being used is the digital interrupt on port 0/1, 2) whenever a digital interrupt occurs, the value on digital I/O port 2 should be read, and 3) on digital interrupt occurrence, the value 0x01 should be written to digital I/O port 5. Furthermore, assume the interrupts occur fast enough that dealing with them in user space is unreliable.

Because the interrupt handler provided with the driver offers generic services suitable for a wide range of purposes, it does not provide the functionality indicated above. Therefore to meet your requirements, you must rewrite the interrupt handler. A detailed description of writing interrupt handlers lies beyond the scope of this document. What follows is pseudo code for an interrupt handler which implements the desired behavior.

```
interrupt_handler() {

    /*
     * Determine interrupt status
     */

    read IRQ Status Register at offset 0x11;
    if bit 0 is not set in register
    then

        /*
         * Spurious interrupt
         */

        exit;
    end if
```

```
    /*
     * Acknowledge the interrupt.  This consists of two steps: 1) writing the
     * appropriate value to the Port 0/1 Program Digital Mode Register to select
     * clear mode access to Port 0/1 Clear IRQ Register, and 2) reading Port 0/1
     * Clear IRQ Register to acknowledge and clear the interrupt.
     */

    write to Port 0/1 Program Digital Mode Register at offset 0x03;
    read Port 0/1 Clear IRQ Register at offset 0x02;

    /*
     * Read value on digital I/O port 2
     */

    read Digital I/O Port 2 Register at offset 0x04;

    /*
     * Write 0x01 to digital I/O port 5
     */

    write 0x01 to Digital I/O port 5 Register at offset 0x09;
}
```

Using the API Functions

DM6810 hardware and the associated driver functionality can be accessed through the library API (Application Programming Interface) functions. Applications wishing to use library functions must include the include/dm6810_library.h header file and be statically linked with the lib/librtd-dm6810.a library file.

Because of changes made in driver version 2.0.0, existing source code which uses the library will not compile. Some of the areas requiring attention on your part are:

* All header files have been renamed. Users upgrading from a previous driver version will need to modify source code to include the appropriate header files.
* All header files have been relocated to include/. Be sure to update any files which contain hardcoded header file paths.
* 6810 has been appended to all library function names with the exception of class constructors and destructors.
* Library functions which accepted a digital I/O chip number now accept a digital I/O port number.
* Interrupt notification via signals is no longer supported. The new notification paradigm provides a function which can block in the kernel until an interrupt occurs.
* The driver now acknowledges all interrupts in the interrupt handler. Therefore, interrupt status is no longer available to an application through certain functions.
* All classes have been coalesced into a single class DM6810Device.
* The DM6810 /dev entry file names have changed. For example, the device file previously named /dev/rtd/dm6810hr/device0 is now called /dev/rtd-dm6810-0.

The following function reference provides for each library routine a prototype, description, explanation of parameters, and return value or error code. By looking at a function's entry, you should gain an idea of: 1) why it would be used, 2) what it does, 3) what information is passed into it, 4) what information it passes back, 5) how to interpret error conditions that may arise, and 6) the ioctl() system call interface if the function makes use of a single ioctl() call.

Note that errno codes other than the ones indicated in the following pages may be set by the library functions. Please see the ioctl(2) man page for more information.

Function Reference

API Function Groups

Digital I/O

DIOClearChip6810
DIOClearIrq6810
DIOClearStrobe6810
DIOEnableIrq6810
DIOIsIrq6810
DIOIsIRQ6810
DIOIsStrobe6810
DIORead6810
DIOSelectClock6810
DIOSelectRegister6810
DIOSetIRQSource6810
DIOSetPortDirection6810
DIOStrobeEnable6810
DIOWrite6810

General

CloseBoard6810
DM6810Device
~DM6810Device
GetDriverVersion6810
InitBoard6810
OpenBoard6810
ReadByte6810
WriteByte6810

Interrupt Control and Status

ClearP14IRQ6810
EnableIRQSharing6810
EnableP14IRQ6810
GetIRQStatus6810
GetLastIntStatus6810
IsP14IRQ6810
LoadIRQRegister6810
SetP14IRQPolarity6810

Timer/Counter Control and Status

ClockDivisor6810
ClockMode6810
DoneTimer6810
ReadTimerCounter6810
SetUserClock6810

Alphabetical Function Listing

ClearP14IRQ6810

void ClearP14IRQ6810(void);

Description:

Clear a DM6810 device's P14 interrupt status flag. This will acknowledge a P14 interrupt which has occurred.

NOTE: There is no need to call this function from an application. Interrupts are automatically acknowledged by the driver's interrupt handler.

Parameters:

None.

Return Value:

None.

IOCTL Interface:

```
dm6810_ioctl_argument_t ioctl_request;
int file_descriptor;
int status;

/*
 * Before calling ioctl(), file_descriptor must be set up.  This is not shown
 * here.
 */

/*
 * Read the Clear IRQ Register at base I/O address + 16
 */

ioctl_request.access_8.offset = 0x10;

/*
 * This value does not matter because it is ignored making the request
 */

ioctl_request.access_8.data = 0;

status = ioctl(file_descriptor, DM6810_IOCTL_READ_8_BITS, &ioctl_request);
```

ClockDivisor6810

bool ClockDivisor6810(u_int8_t Timer, u_int16_t Divisor);

Description:

Set the divisor for the given 8254 timer/counter.

NOTE: Before calling this function, you must ensure that the indicated timer/counter is set to be programmed least significant byte first then most significant byte.

Parameters:

Timer: The timer to operate on. Valid values are:

- 0 Timer/counter 0
- 1 Timer/counter 1
- 2 Timer/counter 2

Divisor: Counter divisor. Valid values are 0 through 65535.

Return Value:

true: Success.

false: Failure with errno set as follows:

EINVAL Timer is not valid.

Please see the description of the internal function outb() for information on other possible values errno may have in this case.

IOCTL Interface:

This function makes use of several ioctl() requests.

ClockMode6810

---

bool ClockMode6810(u_int8_t Timer, u_int8_t Mode);

Description:

Set the mode for the given 8254 timer/counter.

NOTE: This function puts the indicated timer/counter into binary mode.

NOTE: This function sets the timer/counter to read/load least significant byte first then most significant byte.

Parameters:

Timer: The timer to operate on. Valid values are:

- 0 Timer/counter 0
- 1 Timer/counter 1
- 2 Timer/counter 2

Mode: The counter mode to set. Valid values are:

- 0 Event count
- 1 Programmable one shot
- 2 Rate generator
- 3 Square wave rate generator
- 4 Software triggered strobe
- 5 Hardware triggered strobe

Return Value:

true: Success.

false: Failure with errno set as follows:

EINVAL Timer is not valid.

EINVAL Mode is not valid.

Please see the description of the internal function outb() for information on other possible values errno may have in this case.

IOCTL Interface:

```
dm6810_ioctl_argument_t ioctl_request;
int file_descriptor;
int status;

/*
 * Before calling ioctl(), file_descriptor must be set up.  This is not shown
 * here.
 */

/*
 * Write to the 8254 Timer/Counter Control Word Register at base I/O address + 15
 */

ioctl_request.access_8.offset = 0x0F;

/*
 * Set timer to read/load least significant byte first then most significant
 * byte.  Because bit 0 is set to zero, this puts the timer in binary mode.
 */

ioctl_request.access_8.data = 0x30;

/*
 * Operate on timer/counter 1
 */

ioctl_request.access_8.offset |= 0x40;

/*
 * Put timer in rate generator mode
 */

ioctl_request.access_8.offset |= 0x04;

status = ioctl(file_descriptor, DM6810_IOCTL_WRITE_8_BITS, &ioctl_request);
```

CloseBoard6810

bool CloseBoard6810(void);

Description:

Close a DM6810 device file.

Parameters:

None.

Return Value:

true:	Success.
false:	Failure. Please see the close(2) man page for information on possible values errno may have in this case.

IOCTL Interface:

None.

DIOClearChip6810

---

bool DIOClearChip6810(u_int8_t Port);

Description:

Clear the digital I/O chip for the given digital I/O port.

NOTE: The digital I/O ports exist in pairs. Ports 0 & 1 form a pair, as do ports 2 & 3, and ports 4 & 5. Therefore, clearing the digital I/O chip for a port also clears the digital I/O chip for the other port in the pair.

Parameters:

Port: Digital I/O port for which to clear chip. Valid values are:

0	Digital I/O port 0
1	Digital I/O port 1
2	Digital I/O port 2
3	Digital I/O port 3
4	Digital I/O port 4
5	Digital I/O port 5

Return Value:

true:	Success.
false:	Failure with errno set as follows:

EINVAL	Port is not valid.

Please see the descriptions of the internal functions outb() and select_dio_control_register() for information on other possible values errno may have in this case.

IOCTL Interface:

This function makes use of several ioctl() requests.

DIOClearIrq6810

bool DIOClearIrq6810(u_int8_t Port);

Description:

Clear the Digital IRQ Status bit for the given digital I/O port.

NOTE: The digital I/O ports exist in pairs. Ports 0 & 1 form a pair, as do ports 2 & 3, and ports 4 & 5. Therefore, clearing the Digital IRQ Status bit for a port also clears the Digital IRQ Status bit for the other port in the pair.

NOTE: There is no need to call this function from an application. Interrupts are automatically acknowledged by the driver's interrupt handler.

Parameters:

Port: Digital I/O port to clear IRQ status of. Valid values are:

- 0 Digital I/O port 0
- 1 Digital I/O port 1
- 2 Digital I/O port 2
- 3 Digital I/O port 3
- 4 Digital I/O port 4
- 5 Digital I/O port 5

Return Value:

true: Success.

false: Failure with errno set as follows:

EINVAL Port is not valid.

Please see the description of the internal function select_dio_control_register() for information on other possible values errno may have in this case.

IOCTL Interface:

This function makes use of several ioctl() requests.

DIOClearStrobe6810

bool DIOClearStrobe6810(u_int8_t Port);

Description:

Clear the Strobe Status bit in the Read Digital I/O Status Register for the given digital I/O port.

NOTE: The digital I/O ports exist in pairs. Ports 0 & 1 form a pair, as do ports 2 & 3, and ports 4 & 5. Therefore, clearing the Strobe Status bit for a port also clears the Strobe Status bit for the other port in the pair.

NOTE: DIOClearChip6810() does not clear the Strobe Status bit. During program initialization, DIOClearStrobe6810() must be called to ensure that the bit is cleared. Once data is being strobed into an even-numbered port, reading data from that port will clear the Strobe Status flag.

NOTE: Even though this function accepts an odd-numbered port, it is internally translated into the even-numbered port in the pair since only the even-numbered ports support data strobing.

Parameters:

Port: Digital I/O port to clear strobe status of. Valid values are:

- 0 Digital I/O port 0
- 1 Digital I/O port 1
- 2 Digital I/O port 2
- 3 Digital I/O port 3
- 4 Digital I/O port 4
- 5 Digital I/O port 5

Return Value:

true: Success.

false: Failure with errno set as follows:

EINVAL Port is not valid.

IOCTL Interface:

```
dm6810_ioctl_argument_t ioctl_request;
int file_descriptor;
int status;

/*
 * Before calling ioctl(), file_descriptor must be set up.  This is not shown
 * here.
 */

/*
 * Read the Digital I/O Port 0 Register at base I/O address + 0
 */

ioctl_request.access_8.offset = 0x00;

/*
 * This value does not matter because it is ignored making the request
 */

ioctl_request.access_8.data = 0;

status = ioctl(file_descriptor, DM6810_IOCTL_READ_8_BITS, &ioctl_request);
```

bool DIOEnableIrq6810(u_int8_t Port, bool Enable);

Description:

Enable or disable digital interrupts for the given digital I/O port.

NOTE: The digital I/O ports exist in pairs. Ports 0 & 1 form a pair, as do ports 2 & 3, and ports 4 & 5. Therefore, changing the digital interrupt state for a port also changes the digital interrupt state for the other port in the pair.

NOTE: If you are using digital interrupts, make sure data strobing is disabled for the port(s) which will generate the interrupts. Having data strobe enabled for a port disables digital interrupts for that port.

Parameters:

Port: Digital I/O port to modify interrupt state for. Valid values are:

0 Digital I/O port 0
1 Digital I/O port 1
2 Digital I/O port 2
3 Digital I/O port 3
4 Digital I/O port 4
5 Digital I/O port 5

Enable: Flag indicating whether or not digital interrupts should be enabled. A value of true means enable digital interrupts. A value of false means disable digital interrupts.

Return Value:

true: Success.

false: Failure with errno set as follows:

EINVAL Port is not valid.

Please see the description of the internal function outb() for information on other possible values errno may have in this case.

IOCTL Interface:

This function makes use of several ioctl() requests.

bool DIOIsIRQ6810(u_int8_t Port);

Description:

Determine whether or not the given digital I/O port generated an interrupt.

NOTE: The digital I/O ports exist in pairs. Ports 0 & 1 form a pair, as do ports 2 & 3, and ports 4 & 5. Therefore, the interrupt state for a port is indistinguishable from the interrupt state for the other port in the pair.

NOTE: This function examines the contents of the IRQ Status Register at base I/O address + 17.

NOTE: This function is equivalent to DIOIsIrq6810().

NOTE: The information returned by this function is unreliable because the driver's interrupt handler clears all interrupt status flags during interrupt acknowledgement.

Parameters:

Port: Digital I/O port to examine interrupt status of. Valid values are:

- 0 Digital I/O port 0
- 1 Digital I/O port 1
- 2 Digital I/O port 2
- 3 Digital I/O port 3
- 4 Digital I/O port 4
- 5 Digital I/O port 5

Return Value:

false: No interrupt occurred.

true: An interrupt occurred.

IOCTL Interface:

```
dm6810_ioctl_argument_t ioctl_request;
int file_descriptor;
int status;

/*
 * Before calling ioctl(), file_descriptor must be set up.  This is not shown
 * here.
 */

/*
 * Read the IRQ Status Register at base I/O address + 17
 */

ioctl_request.access_8.offset = 0x11;
```

```
/*
 * This value does not matter because it is ignored making the request.
 * However after ioctl() returns, the structure member will contain the
 * register contents.
 */

ioctl_request.access_8.data = 0;

status = ioctl(file_descriptor, DM6810_IOCTL_READ_8_BITS, &ioctl_request);
if (status == 0) {

    /*
     * If bit 0 is set, then interrupt occurred on port 0/1
     */

    if (ioctl_request.access_8.data & 0x01) {
        fprintf(stdout, "Digital I/O port 0/1 generated an interrupt\n");
    }
}
```

DIOIsIrq6810

bool DIOIsIrq6810(u_int8_t Port);

Description:

Determine whether or not the given digital I/O port generated an interrupt.

NOTE: The digital I/O ports exist in pairs. Ports 0 & 1 form a pair, as do ports 2 & 3, and ports 4 & 5. Therefore, the interrupt state for a port is indistinguishable from the interrupt state for the other port in the pair.

NOTE: This function examines the contents of the port's Read Port Digital I/O Status Register.

NOTE: This function is equivalent to DIOIsIRQ6810().

NOTE: The information returned by this function is unreliable because the driver's interrupt handler clears all interrupt status flags during interrupt acknowledgement.

Parameters:

Port: Digital I/O port to examine interrupt status of. Valid values are:

- 0 Digital I/O port 0
- 1 Digital I/O port 1
- 2 Digital I/O port 2
- 3 Digital I/O port 3
- 4 Digital I/O port 4
- 5 Digital I/O port 5

Return Value:

false: No interrupt occurred.

true: An interrupt occurred.

IOCTL Interface:

```
dm6810_ioctl_argument_t ioctl_request;
int file_descriptor;
int status;

/*
 * Before calling ioctl(), file_descriptor must be set up.  This is not shown
 * here.
 */

/*
 * Read the Port 2/3 Digital I/O Status Register at base I/O address + 7
 */

ioctl_request.access_8.offset = 0x07;

/*
 * This value does not matter because it is ignored making the request.
 * However after ioctl() returns, the structure member will contain the
 * register contents.
 */

ioctl_request.access_8.data = 0;

status = ioctl(file_descriptor, DM6810_IOCTL_READ_8_BITS, &ioctl_request);
if (status == 0) {

    /*
     * If bit 7 is set, then interrupt occurred on port 2/3
     */

    if (ioctl_request.access_8.data & 0x80) {
        fprintf(stdout, "Digital I/O port 2/3 generated an interrupt\n");
    }
}
```

DIOIsStrobe6810

bool DIOIsStrobe6810(u_int8_t Port);

Description:

Determine whether or not data has been strobed into the given digital I/O port.

NOTE: The digital I/O ports exist in pairs. Ports 0 & 1 form a pair, as do ports 2 & 3, and ports 4 & 5. Therefore, the strobe state for a port is indistinguishable from the strobe state for the other port in the pair.

NOTE: Only the even-numbered ports support data strobing.

Parameters:

Port: Digital I/O port to examine strobe status of. Valid values are:

- 0 Digital I/O port 0
- 1 Digital I/O port 1
- 2 Digital I/O port 2
- 3 Digital I/O port 3
- 4 Digital I/O port 4
- 5 Digital I/O port 5

Return Value:

false: Data not strobed.

true: Data strobed.

IOCTL Interface:

```
dm6810_ioctl_argument_t ioctl_request;
int file_descriptor;
int status;

/*
 * Before calling ioctl(), file_descriptor must be set up.  This is not shown
 * here.
 */

/*
 * Read the Port 4/5 Digital I/O Status Register at base I/O address + 11
 */

ioctl_request.access_8.offset = 0x0B;


/*
 * This value does not matter because it is ignored making the request.
 * However after ioctl() returns, the structure member will contain the
 * register contents.
 */

ioctl_request.access_8.data = 0;

status = ioctl(file_descriptor, DM6810_IOCTL_READ_8_BITS, &ioctl_request);
if (status == 0) {

    /*
     * If bit 6 is set, then data strobe occurred on port 4
     */

    if (ioctl_request.access_8.data & 0x40) {
        fprintf(stdout, "Data strobed into digital I/O port 4\n");
    }
}
```

DIORead6810

u_int8_t DIORead6810(u_int8_t Port);

Description:

Read an 8-bit value from the given digital I/O port.

Parameters:

Port: The port to read from. Value values are:

- 0 Digital I/O port 0
- 1 Digital I/O port 1
- 2 Digital I/O port 2
- 3 Digital I/O port 3
- 4 Digital I/O port 4
- 5 Digital I/O port 5

Return Value:

8-bit value from specified digital I/O port.

IOCTL Interface:

```
dm6810_ioctl_argument_t ioctl_request;
int file_descriptor;
int status;

/*
 * Before calling ioctl(), file_descriptor must be set up.  This is not shown
 * here.
 */

/*
 * Read the Digital I/O Port 1 Register at base I/O address + 1
 */

ioctl_request.access_8.offset = 0x01;

/*
 * This value does not matter because it is ignored making the request.
 * However after ioctl() returns, the structure member will contain the
 * register contents.
 */

ioctl_request.access_8.data = 0;

status = ioctl(file_descriptor, DM6810_IOCTL_READ_8_BITS, &ioctl_request);
if (status == 0) {
    fprintf(stdout, "Port 1 input: 0x%x\n", ioctl_request.access_8.data);
}
```

DIOSelectClock6810

bool DIOSelectClock6810(u_int8_t Port, bool Programmable);

Description:

Select sampling clock for the given digital I/O port.

NOTE: The digital I/O ports exist in pairs. Ports 0 & 1 form a pair, as do ports 2 & 3, and ports 4 & 5. Therefore, setting the sampling clock for a port also sets the same sampling clock for the other port in the pair.

Parameters:

Port: Port to set clock for. Valid values are:

- 0 Digital I/O port 0
- 1 Digital I/O port 1
- 2 Digital I/O port 2
- 3 Digital I/O port 3
- 4 Digital I/O port 4
- 5 Digital I/O port 5

Programmable: Flag to indicate whether or not 8254 Timer/Counter 1 should be used. A value of false means use the 8 MHz system clock. A value of true mean use the 8254 Timer/Counter 1.

Return Value:

true: Success.

false: Failure with errno set as follows:

EINVAL Port is not valid.

Please see the description of the internal function outb() for information on other possible values errno may have in this case.

IOCTL Interface:

This function makes use of several ioctl() requests.

DIOSelectRegister6810

---

bool DIOSelectRegister6810(u_int8_t Port, u_int8_t Select);

Description:

Select which control register is accessed for the given digital I/O port.

NOTE: This function is not normally required in an application. The other library functions which require digital I/O control register access select that register internally.

Parameters:

Port: The port to select control register for. Value values are:

- 0 Digital I/O port 0
- 1 Digital I/O port 1
- 2 Digital I/O port 2
- 3 Digital I/O port 3
- 4 Digital I/O port 4
- 5 Digital I/O port 5

Select: Control register to access. Valid values are:

- 0 Clear Register
- 1 Even-numbered Port Direction Register
- 2 Odd-numbered Port Direction Register
- 3 IRQ Source Register

Return Value:

true: Success.

false: Failure with errno set as follows:

EINVAL Port is not valid.

EINVAL Select is not valid.

Please see the description of the internal function select_dio_control_register() for information on other possible values errno may have in this case.

IOCTL Interface:

This function makes use of several ioctl() requests.

DIOSetIRQSource6810

---

bool DIOSetIRQSource6810(u_int8_t Port, u_int8_t Bit);

Description:

Set which bit generates a digital interrupt for the given digital I/O port.

NOTE: The digital I/O ports exist in pairs. Ports 0 & 1 form a pair, as do ports 2 & 3, and ports 4 & 5. Therefore, changing the digital interrupt source for a port will overwrite any digital interrupt source set for the other port in the pair.

Parameters:

Port: Port to set digital interrupt source for. Valid values are:

0	Digital I/O port 0
1	Digital I/O port 1
2	Digital I/O port 2
3	Digital I/O port 3
4	Digital I/O port 4
5	Digital I/O port 5

Bit: The bit which generates a digital interrupt. Valid values are:

0	Bit 0
1	Bit 1
2	Bit 2
3	Bit 3
4	Bit 4
5	Bit 5
6	Bit 6
7	Bit 7

Return Value:

true: Success.

false: Failure with errno set as follows:

EINVAL Port is not valid.

EINVAL Bit is not valid.

Please see the description of the internal functions outb() and select_dio_control_register() for information on other possible values errno may have in this case.

IOCTL Interface:

This function makes use of several ioctl() requests.

DIOSetPortDirection6810

---

bool DIOSetPortDirection6810(u_int8_t Port, u_int8_t Direction);

Description:

Set the direction (input or output) for the bits in the given digital I/O port.

Parameters:

Port: Port to set bit direction for. Valid values are:

- 0 Digital I/O port 0
- 1 Digital I/O port 1
- 2 Digital I/O port 2
- 3 Digital I/O port 3
- 4 Digital I/O port 4
- 5 Digital I/O port 5

Direction: Bit mask which controls bit direction. A zero in a bit position means the corresponding port bit is set to input. A one in a bit position means the corresponding port bit is set to output.

Return Value:

true: Success.

false: Failure with errno set as follows:

EINVAL Port is not valid.

Please see the description of the internal functions outb() and select_dio_control_register() for information on other possible values errno may have in this case.

IOCTL Interface:

This function makes use of several ioctl() requests.

DIOStrobeEnable6810

bool DIOStrobeEnable6810(u_int8_t Port, bool Enable);

Description:

Enable or disable data strobing for the given digital I/O port.

NOTE: The digital I/O ports exist in pairs. Ports 0 & 1 form a pair, as do ports 2 & 3, and ports 4 & 5. Therefore, changing the data strobe state for a port also changes the data strobe state for the other port in the pair.

NOTE: Only the even-numbered ports support data strobing.

Parameters:

Port: Port to set data strobing for. Valid values are:

- 0 Digital I/O port 0
- 1 Digital I/O port 1
- 2 Digital I/O port 2
- 3 Digital I/O port 3
- 4 Digital I/O port 4
- 5 Digital I/O port 5

Enable: Flag indicating whether or not data strobe should be enabled. A value of true means enable data strobe. A value of false means disable data strobe.

Return Value:

true: Success.

false: Failure with errno set as follows:

EINVAL Port is not valid.

Please see the description of the internal function outb() for information on other possible values errno may have in this case.

IOCTL Interface:

This function makes use of several ioctl() requests.

DIOWrite6810

bool DIOWrite6810(u_int8_t Port, u_int8_t Data);

Description:

Write an 8-bit value to the given digital I/O port.

Parameters:

Port: The port to write to. Value values are:

0 Digital I/O port 0
1 Digital I/O port 1
2 Digital I/O port 2
3 Digital I/O port 3
4 Digital I/O port 4
5 Digital I/O port 5

Data: Data to write. Valid values are 0 through 255.

Return Value:

true: Success.

false: Failure with errno set as follows:

EINVAL Port is not valid.

Please see the description of the internal function outb() for information on other possible values errno may have in this case.

IOCTL Interface:

```
dm6810_ioctl_argument_t ioctl_request;
int file_descriptor;
int status;

/*
 * Before calling ioctl(), file_descriptor must be set up.  This is not shown
 * here.
 */

/*
 * Write to the Digital I/O Port 3 Register at base I/O address + 5
 */

ioctl_request.access_8.offset = 0x05;

/*
 * Write a value with bits 4 through 7 set to one
 */

ioctl_request.access_8.data = 0xF0;

status = ioctl(file_descriptor, DM6810_IOCTL_WRITE_8_BITS, &ioctl_request);
```

DM6810Device

DM6810Device(void);

Description:

DM6810Device class constructor.

Parameters:

None.

Return Value:

None. Constructors do not return a value.

IOCTL Interface:

None.

~DM6810Device

~DM6810Device(void);

Description:

DM6810Device class destructor.

Parameters:

None.

Return Value:

None. Destructors do not return a value.

IOCTL Interface:

None.

DoneTimer6810

---

bool DoneTimer6810(void);

Description:

Set each timer/counter into rate generator mode and load each with a divisor value of two.

Parameters:

None.

Return Value:

true: Success.

false: Failure. Please see the descriptions of ClockMode6810() and ClockDivisor6810() for information on possible values errno may have in this case.

IOCTL Interface:

This function makes use of several ioctl() requests.

EnableIRQSharing6810

bool EnableIRQSharing6810(u_int8_t Enable);

Description:

Enable or disable a board's interrupt sharing feature.

NOTE: This function also modifies the library's internal cache of the board's Clear IRQ/IRQ Enable Register value.

NOTE: The DM6810 interrupt handler is not designed to process interrupts shared between devices. To avoid unpredictable behavior or worse, do not share an interrupt between devices.

NOTE: Interrupts do not need to be shared in order to use several interrupt sources on a single board. For example if you wish to use both P14 and port 0 digital interrupts on a single DM6810 device, then interrupts do not need to be shared.

Parameters:

Enable: Flag indicating whether or not interrupt sharing should be enabled. A value of 0 means disable interrupt sharing. Any other value means enable interrupt sharing.

Return Value:

true: Success.

false: Failure. Please see the description of the internal function outb() for information on possible values errno may have in this case.

IOCTL Interface:

```
dm6810_ioctl_argument_t ioctl_request;
int file_descriptor;
int status;

/*
 * Before calling ioctl(), file_descriptor must be set up.  This is not shown
 * here.
 */
```

```
/*
 * Write to the IRQ Enable Register at base I/O address + 16
 */

ioctl_request.access_8.offset = 0x10;

/*
 * Enable P14 interrupt.  Because bit 1 is set to zero, interrupts occur on
 * positive edge of pulse.
 */

ioctl_request.access_8.data = 0x01;

/*
 * Disable IRQ sharing
 */

ioctl_request.access_8.data |= 0x04;

status = ioctl(file_descriptor, DM6810_IOCTL_WRITE_8_BITS, &ioctl_request);
```

EnableP14IRQ6810

bool EnableP14IRQ6810(bool Enable);

Description:

Enable or disable P14 interrupts on a DM6810 device.

NOTE: This function also modifies the library's internal cache of the board's Clear IRQ/IRQ Enable Register value.

Parameters:

Enable: Flag indicating whether or not P14 interrupts should be enabled. A value of true means enable P14 interrupts. A value of false means disable P14 interrupts.

Return Value:

true: Success.

false: Failure. Please see the description of the internal function outb() for information on possible values errno may have in this case.

IOCTL Interface:

```
dm6810_ioctl_argument_t ioctl_request;
int file_descriptor;
int status;

/*
 * Before calling ioctl(), file_descriptor must be set up.  This is not shown
 * here.
 */

/*
 * Write to the IRQ Enable Register at base I/O address + 16
 */

ioctl_request.access_8.offset = 0x10;
```

```
/*
 * Disable P14 interrupt (bit 0 == 0) and disable IRQ sharing (bit 2 == 1)
 */

ioctl_request.access_8.data = 0x04;

status = ioctl(file_descriptor, DM6810_IOCTL_WRITE_8_BITS, &ioctl_request);
```

GetDriverVersion6810

bool GetDriverVersion6810(u_int32_t *version_p);

Description:

Get the driver version number. The version number is an unsigned integer encoding the major, minor, and patch level numbers.

NOTE: The driver version is encoded according to the formula

```
Version = (
    (MajorVersion << 16)
    |
    (MinorVersion << 8)
    |
    PatchLevelNumber
)
```

Parameters:

version_p: Address where version number should be stored. If this is NULL, then no version number is returned. This location is unchanged if the function fails.

Return Value:

true: Success.

false:

version_p is NULL.

Failure. Please see the ioctl(2) man page for information on possible values errno may have in this case.

IOCTL Interface:

```
dm6810_ioctl_argument_t ioctl_request;
int file_descriptor;
int status;

/*
 * Before calling ioctl(), file_descriptor must be set up.  This is not shown
 * here.
 */

status = ioctl(file_descriptor, DM6810_IOCTL_GET_DRIVER_VERSION, &ioctl_request);
```

```
if (status == 0) {
    u_int32_t  version;

    version = ioctl_request.version.driver_version;

    fprintf(stdout, "Major version: %d\n", ((version >> 16) & 0xF));
    fprintf(stdout, "Minor version: %d\n", ((version >> 8) & 0xF));
    fprintf(stdout, "Patch level: %d\n", (version & 0xF));
}
```

GetIRQStatus6810

u_int8_t GetIRQStatus6810(void);

Description:

Get the contents of a board's IRQ Status Register at base I/O address + 17.

NOTE: Only bits 0 through 3 are returned.

NOTE: The information returned by this function is unreliable because the driver's interrupt handler clears all interrupt status flags during interrupt acknowledgement.

Parameters:

None.

Return Value:

IRQ Status Register contents. Please see the hardware manual for the interpretation of register bits.

IOCTL Interface:

```
dm6810_ioctl_argument_t ioctl_request;
int file_descriptor;
int status;

/*
 * Before calling ioctl(), file_descriptor must be set up.  This is not shown
 * here.
 */

/*
 * Read the IRQ Status Register at base I/O address + 17
 */

ioctl_request.access_8.offset = 0x11;

/*
 * This value does not matter because it is ignored making the request.
 * However after ioctl() returns, the structure member will contain the
 * register contents.
 */

ioctl_request.access_8.data = 0;

status = ioctl(file_descriptor, DM6810_IOCTL_READ_8_BITS, &ioctl_request);
if (status == 0) {
    fprintf(stdout, "IRQ Status: 0x%x\n", (ioctl_request.access_8.data & 0xF));
}
```

```
bool GetLastIntStatus6810(
    u_int32_t *int_count_p,
    u_int8_t *status_reg_p,
    bool wait_for_interrupt
);
```

Description:

Get the driver's interrupt count and IRQ Status Register value at the time of the most recent interrupt.

NOTE: This function can be used to provide interrupt notification if wait_for_interrupt is set to true. In this case, the function does not exit the kernel until the driver's interrupt handler wakes the process up.

NOTE: If wait_for_interrupt is true, this function will always wait for the next interrupt to occur even if an interrupt just happened.

NOTE: Only bits 0 through 3 in the IRQ Status Register are returned.

NOTE: If you are using this function to wait for interrupts, signals can wake up the process before an interrupt occurs. If a signal is delivered to the process during a wait, no status or count is returned and the application is responsible for dealing with the premature awakening in a reasonable manner.

Parameters:

int_count_p:	Address where interrupt count should be stored. Nothing is written here if the function fails.
status_reg_p:	Address where Status Register value should be stored. Nothing is written here if the function fails.
wait_for_interrupt:	Flag indicating whether or not to wait for an interrupt to occur before returning status. A value of false means return the most recent interrupt status without waiting. A value of true means wait for an interrupt to occur and then return status.

Return Value:

true: Success.

false: Failure with errno set as follows:

EINTR The process received a signal before an interrupt occurred.

Please see the ioctl(2) man page for information on other possible values errno may have in this case.

IOCTL Interface:

```
dm6810_ioctl_argument_t ioctl_request;
int file_descriptor;
int status;

/*
 * Before calling ioctl(), file_descriptor must be set up.  This is not shown
 * here.
 */

/*
 * Wait in the kernel until the next interrupt occurs before returning status
 */

ioctl_request.last_int_status.wait_for_interrupt = 0xFF;

/*
 * These values do not matter because they are ignored making the request.
 * However after ioctl() returns, the structure members will contain the
 * requested information.
 */

ioctl_request.last_int_status.status_reg = 0;
ioctl_request.last_int_status.int_count = 0;

status = ioctl(
    file_descriptor, DM6810_IOCTL_GET_LAST_INT_STATUS, &ioctl_request
);
if (status == 0) {
    fprintf(stdout, "Status at last interrupt:\n");
    fprintf(
        stdout, "    IRQ Status: 0x%x\n", ioctl_request.last_int_status.status_reg
    );
    fprintf(
        stdout, "    # interrupts: %d\n", ioctl_request.last_int_status.int_count
    );
}
```

InitBoard6810

void InitBoard6810(void);

Description:

Initialize DM6810 device class library state. This consists of clearing the library's internal cache of the board's Clear IRQ/IRQ Enable Register value.

NOTE: This function does not update the board's Clear IRQ/IRQ Enable Register.

Parameters:

None.

Return Value:

None.

IOCTL Interface:

None.

IsP14IRQ6810

bool IsP14IRQ6810(void);

Description:

Determine whether or not a board's interrupt circuit generated a P14 interrupt.

NOTE: The information returned by this function is unreliable because the driver's interrupt handler clears all interrupt status flags during interrupt acknowledgement.

Parameters:

None.

Return Value:

false: No interrupt occurred.

true: An interrupt occurred.

IOCTL Interface:

```
dm6810_ioctl_argument_t ioctl_request;
int file_descriptor;
int status;

/*
 * Before calling ioctl(), file_descriptor must be set up.  This is not shown
 * here.
 */

/*
 * Read the IRQ Status Register at base I/O address + 17
 */

ioctl_request.access_8.offset = 0x11;

/*
 * This value does not matter because it is ignored making the request.
 * However after ioctl() returns, the structure member will contain the
 * register contents.
 */

ioctl_request.access_8.data = 0;

status = ioctl(file_descriptor, DM6810_IOCTL_READ_8_BITS, &ioctl_request);
if (status == 0) {
    if (ioctl_request.access_8.data & 0x08) {
        fprintf(stdout, "P14 interrupt occurred\n");
    }
}
```

LoadIRQRegister6810

bool LoadIRQRegister6810(u_int8_t Value);

Description:

Load an 8-bit value into a board's Clear IRQ/IRQ Enable Register at base I/O address + 16.

NOTE: This function also sets the library's internal cache of the board's Clear IRQ/IRQ Enable Register value.

Parameters:

Value: Value to store in register. Valid values are 0 through 7. Please see the hardware manual for the interpretation of the register's bits.

Return Value:

true: Success.

false: Failure. Please see the description of the internal function outb() for information on possible values errno may have in this case.

IOCTL Interface:

```
dm6810_ioctl_argument_t ioctl_request;
int file_descriptor;
int status;

/*
 * Before calling ioctl(), file_descriptor must be set up.  This is not shown
 * here.
 */

/*
 * Write to the IRQ Enable Register at base I/O address + 16
 */

ioctl_request.access_8.offset = 0x10;

/*
 * Enable P14 interrupt (bit 0 == 1), set IRQ polarity to negative edge
 * (bit 1 == 1), and disable IRQ sharing (bit 2 == 1)
 */

ioctl_request.access_8.data = 0x07;

status = ioctl(file_descriptor, DM6810_IOCTL_WRITE_8_BITS, &ioctl_request);
```

OpenBoard6810

bool OpenBoard6810(u_int32_t nDevice);

Description:

Open a DM6810 device file.

Parameters:

nDevice: Minor number of DM6810 device file.

Return Value:

true: Success.

false: Failure. Please see the open(2) man page for information on possible values errno may have in this case.

IOCTL Interface:

None.

ReadByte6810

---

bool ReadByte6810(u_int8_t offset, u_int8_t *data_p);

Description:

Read an 8-bit value from the given offset within a DM6810 board's I/O memory.

NOTE: It is strongly suggested that you use other library functions instead of directly accessing a board's registers.

Parameters:

offset: Offset within I/O memory to read.

data_p: Address where data read should be stored. Nothing is written here if the function fails.

Return Value:

true: Success.

false: Failure with errno set as follows:

EINVAL offset is not valid.

EOPNOTSUPP offset is valid but it represents a write-only register.

Please see the ioctl(2) man page for information on other possible values errno may have in this case.

IOCTL Interface:

```
dm6810_ioctl_argument_t ioctl_request;
int file_descriptor;
int status;

/*
 * Before calling ioctl(), file_descriptor must be set up.  This is not shown
 * here.
 */

/*
 * Read the IRQ Status Register at base I/O address + 17
 */

ioctl_request.access_8.offset = 0x11;

/*
 * This value does not matter because it is ignored making the request.
 * However after ioctl() returns, the structure member will contain the
 * register contents.
 */
```

```
ioctl_request.access_8.data = 0;

status = ioctl(file_descriptor, DM6810_IOCTL_READ_8_BITS, &ioctl_request);
```

ReadTimerCounter6810

u_int16_t ReadTimerCounter6810(u_int8_t Timer);

Description:

Read the count for the given timer/counter.

Parameters:

Timer: The timer to operate on. Valid values are:

- 0 Timer/counter 0
- 1 Timer/counter 1
- 2 Timer/counter 2

Return Value:

16-bit counter value.

IOCTL Interface:

This function makes use of several ioctl() requests.

SetP14IRQPolarity6810

bool SetP14IRQPolarity6810(u_int8_t Polarity);

Description:

Control whether P14 interrupts occur on rising or falling edge of pulse.

NOTE: This function also modifies the library's internal cache of the board's Clear IRQ/IRQ Enable Register value.

Parameters:

Polarity: Selects pulse edge which triggers an interrupt. A value of 0 means rising edge. Any other value means falling edge.

Return Value:

true: Success.

false: Failure. Please see the description of the internal function outb() for information on possible values errno may have in this case.

IOCTL Interface:

```
dm6810_ioctl_argument_t ioctl_request;
int file_descriptor;
int status;

/*
 * Before calling ioctl(), file_descriptor must be set up.  This is not shown
 * here.
 */

/*
 * Write to the IRQ Enable Register at base I/O address + 16
 */

ioctl_request.access_8.offset = 0x10;

/*
 * Enable P14 interrupt (bit 0 == 1), set IRQ polarity to positive edge
 * (bit 1 == 0), and disable IRQ sharing (bit 2 == 1)
 */

ioctl_request.access_8.data = 0x05;

status = ioctl(file_descriptor, DM6810_IOCTL_WRITE_8_BITS, &ioctl_request);
```

SetUserClock6810

float SetUserClock6810(u_int8_t Timer, float InputRate, float OutputRate);

Description:

Set the given timer/counter into rate generator mode and program its divisor value based upon the specified input and output rates.

Parameters:

Timer:	The timer to program. Valid values are: 0 Timer/counter 0 1 Timer/counter 1 2 Timer/counter 2
InputRate:	Input clock rate to timer/counter.
OutputRate:	Desired output rate.

Return Value:

Actual clock frequency programmed.

IOCTL Interface:

This function makes use of several ioctl() requests.

bool WriteByte6810(u_int8_t offset, u_int8_t data);

Description:

Write an 8-bit value to the given offset within a DM6810 board's I/O memory.

NOTE: It is strongly suggested that you use other library functions instead of directly accessing a board's registers.

Parameters:

offset: Offset within I/O memory to write.

data: Data to write.

Return Value:

true: Success.

false: Failure with errno set as follows:

EINVAL offset is not valid.

EOPNOTSUPP offset is valid but it represents a read-only register.

Please see the ioctl(2) man page for information on other possible values errno may have in this case.

IOCTL Interface:

```
dm6810_ioctl_argument_t ioctl_request;
int file_descriptor;
int status;

/*
 * Before calling ioctl(), file_descriptor must be set up.  This is not shown
 * here.
 */

/*
 * Write to the Digital I/O Port 1 Register at base I/O address + 1
 */

ioctl_request.access_8.offset = 0x01;

/*
 * Write all zeros to the port
 */

ioctl_request.access_8.data = 0x00;

status = ioctl(file_descriptor, DM6810_IOCTL_WRITE_8_BITS, &ioctl_request);
```

Example Programs Reference

Name	Remarks
basic-test	Tests the basic functionality of the driver and library.
digital-interrupts	Demonstrates how to use digital interrupts.
digital-io	Demonstrates reading from and writing to the digital I/O ports.
dio-test	Tests the library functions related to digital I/O.
external-int	Demonstrates how to set up external interrupts.
interrupt-test	Tests the library interrupt-related functions.
interrupt-wait	Demonstrates waiting for interrupt notification.
strobe	Demonstrates how to set up data strobing.
timer-interrupts	Demonstrates generating P14 interrupts via timer/counter 2.
timers	Demonstrates using the 8254 timer/counters in rate generator and event count modes.
timer-test	Tests the basic functionality of the 8254 timer/counter library functions.

Limited Warranty

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